

Electrical Power Engineering (2)

Code: EP2207

Lecture: 4

Tutorial: 4

Total: 8

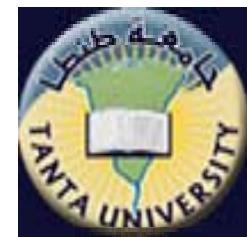
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Engineering



Tanta University

This course aims at providing the basic knowledge in order to:

- **Know the overall representation of power systems and per-unit quantities**
- **Realize the power circle diagrams**
- **Recognize the network equations and solutions**
- **Deal with the control of voltage and reactive power**
- **Realize economics of power factor**
- **Identify the high-voltage D.C. overhead transmission lines**
- **Know the principles to underground cables**

Intended Learning Outcomes (ILOs)

Knowledge and Understanding

- a1- Classify the representations of different types of transmission lines
- a2- Identify the performance of using Power Circle Diagrams
- a3- State the methods of Network Solutions
- a4- Outline the Control of Voltage and Reactive Power
- a5- Enumerate the components of High-voltage D.C. Overhead TLs
- a6- Mention the methods of Power Factor Economics

Intended Learning Outcomes (ILOs)

Intellectual Skills

- b1- Describe the function of each component of electric power systems
- b2- Analyze the mathematical equations used to solve power system equations
- b3- Demonstrate the control of voltage and reactive Power
- b4- Deduce the mathematical equations related to economics of power factor
- b5- Visualize the operation of underground cables

Intended Learning Outcomes (ILOs)

Professional and Practical Skills

- c1- Illustrate the required Power Circle Diagrams of transmission lines
- c2- Apply the Per-Unit method to solve power system problems
- c3- Calculate the optimal power factor for certain loads
- c4- Compute the equivalent capacitance of Underground Cables

Intended Learning Outcomes (ILOs)

General and Transferable Skills

- d1- Cooperate to collect information about certain topics
- d2- Report a main subject through defined groups
- d3- Build self confidence

Weighting of Assessments (100)

Mid-term examination	10.0 %
Final-term examination	60 %
Oral examination.	20.0 %
Practical examination	0.0 %
Semester work	10.0 %
Other types of assessment	0.0 %
Total	100%

References

- Dr. Ahmed M. Refaat, “Electric power engineering (2)”, electrical power and machines department, faculty of engineering, Tanta university
- I. J. Nagrath, D. P. Kothari , "Modern power system analysis", Tata McGraw-Hill Book Company, New Delhi, 1989, 2003
- Chard F. de la C, "Power system engineering", Cleaver-Hume, London, 1962
- Gupta B. R, "Power System Analysis and Design", S. Chand and Company, New Delhi, 1998

References

- P. S. R. Murty, "Power System Operation and control",
P. S. R. Murty, New Delhi, 1984
- I. J. Nagrath, D. P. Kothari, "Power system engineering", Tata McGraw-Hill Book Company, New Delhi, 2003
- Mehta V. K, "Principles of Power System", S. Chand and Company, New Delhi, 1993
- Saadat Hadi, "Power System Analysis", Tata McGraw-Hill Publishing Company LTD, New Delhi, 1999

Performance of long transmission lines

r: is the resistance per unit length of the line

l: is inductance per unit length of the line

z: is impedance per unit length of the line

c: is capacitance per unit length of the line

y: is admittance per unit length of the line

θ: is the propagation constant معامل الإنتشار

$$\theta = \sqrt{zy}$$

Performance of long transmission lines

$$\theta = \alpha + j \beta$$

α : is the attenuation constant معامل التوهين

β : is the phase constant

Z_0 : is the characteristic impedance of the line

$$Z_0 = \sqrt{\frac{Z}{Y}}$$